

# Model 479

## Twin Channel Optically Isolated Pyroelectric IR Detector with Source Follower



Manufactured under one or more of the following U.S. patents: 3,839,640 - 4,218,620 - 4,326,663 - 4,384,207 - 4,437,003 - 4,441,023 - 4,523,095

**Model 479** contains two lithium tantalate sensing elements and two JFET source followers sealed into a standard TO-5 transistor package with two optical filters.

A patented element mounting technique is used to improve the thermal time constant and reduce effects of microphony.

A source resistor is needed to set the drain current and consequently the operating parameters of the JFET. A 47kΩ or greater value is recommended.

# Model 479M1

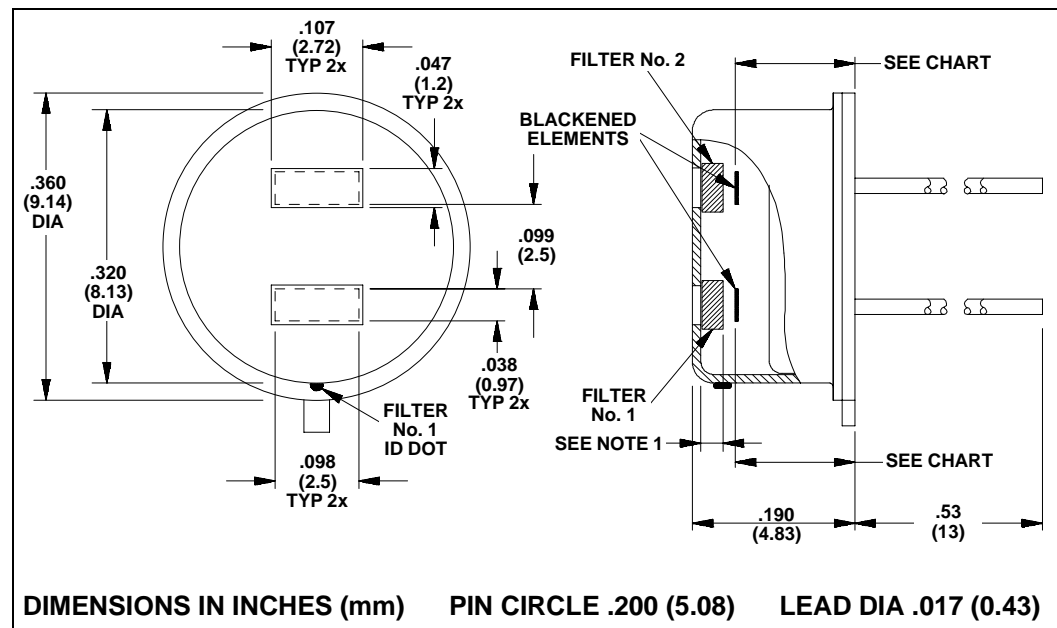
## Twin Channel Optically Isolated Pyroelectric IR Detector with High Gain Electronics

Manufactured under one or more of the following U.S. patents: 3,839,640 - 4,218,620 - 4,326,663 - 4,384,207 - 4,437,003 - 4,441,023 - 4,523,095

**Model 479M1** is similar to the **Model 479** except that the 479M1 has high gain electronics, a different value load resistor and different specifications. A 100kΩ or greater source resistor is recommended for this Model.

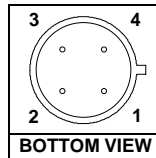
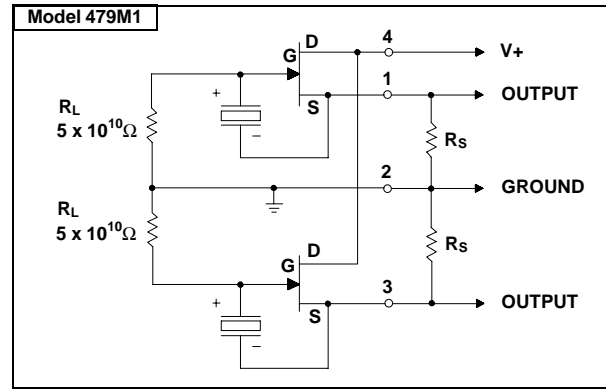
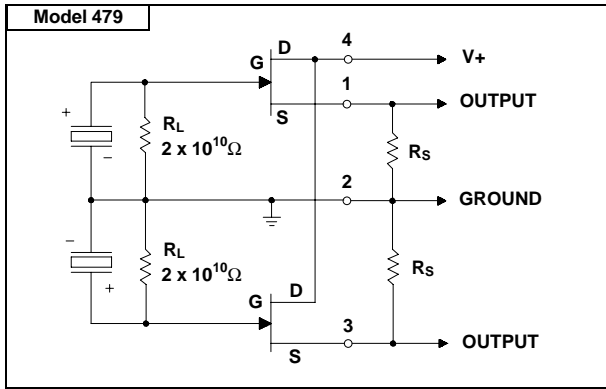
### Applications

- Gas Analysis and Monitoring
- ATR (Attenuated Total Reflectance) for Liquids
- Medical Monitoring
- Flame Monitoring
- Increased Instrumentational Discrimination to Resolve Either/Or Situations
- 2-Color Pyrometers



- NOTES: 1. FILTER THICKNESS DEPENDENT ON TYPE. BOTH MODELS ACCOMMODATE FILTERS .010 TO .040 THICK. ELEMENT HEIGHT VARIES DEPENDING ON FILTER USED. SEE CHART.
2. IF THE 2 INTERNAL FILTERS ARE THE SAME TYPE, THE ID DOT IS ELIMINATED.
3. OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

ELEMENT / FILTER CHART	
FILTER THICKNESS	ELEMENT HEIGHT
.010	.155 (NOM)
.020	.145 (NOM)
.030	.135 (NOM)
.040	.125 (NOM)



**PIN DESIGNATIONS**  
**PIN # 1. FILTER No. 1 OUTPUT**  
**PIN # 2. GND / CASE**  
**PIN # 3. FILTER No. 2 OUTPUT**  
**PIN # 4. V+**

Characteristics	479	Unit	Test Conditions	479M1	Unit	Test Conditions	ELTECdata Reference
Detector Type	Twin Channel			Twin Channel			
Element Size	1.0 x 2.5	mm, each		1.0 x 2.5	mm, each		
Optical Bandwidth	0.1 to 1,000	$\mu\text{m}$	Various Filters	0.1 to 1,000	$\mu\text{m}$	Various Filters	101
	3.71 to 3.89	$\mu\text{m}$	-380 Filter, CWL = 3.80 $\mu\text{m}$	3.71 to 3.89	$\mu\text{m}$	-380 Filter, CWL = 3.80 $\mu\text{m}$	
Responsivity (typ)	2,080	V/W	3.80 $\mu\text{m}$ Channel	12,990	V/W	3.80 $\mu\text{m}$ Channel	
	1,970	V/W	3.33 $\mu\text{m}$ Channel	10,110	V/W	4.268 $\mu\text{m}$ Channel	
Channel Separation (typ)	30	dB		30	dB		
Noise (typ)	1.70	$\mu\text{Vrms}/\sqrt{\text{Hz}}$	Each Channel	8.70	$\mu\text{Vrms}/\sqrt{\text{Hz}}$	Each Channel	
NEP (typ)	$8.38 \times 10^{-10}$	$\text{W}/\sqrt{\text{Hz}}$	Each Channel	$7.52 \times 10^{-10}$	$\text{W}/\sqrt{\text{Hz}}$	Each Channel	100
D* (typ)	$1.85 \times 10^8$	$\text{cm}\sqrt{\text{Hz}}/\text{W}$	Each Channel	$2.06 \times 10^8$	$\text{cm}\sqrt{\text{Hz}}/\text{W}$	Each Channel	100
Operating Voltage (min)	3	VDC	V+ to Gnd	5	VDC	V+ to Gnd	104
	15			10			
Offset Voltage (min)	0.3	V	Each Channel $R_S = 100 \text{ k}\Omega$	0.8	V	Each Channel $R_S = 100 \text{ k}\Omega$	106
	1.2			3.0			
Operating Current (min)	3.0	$\mu\text{A}$	Each Channel $R_S = 100 \text{ k}\Omega$	8.0	$\mu\text{A}$	Each Channel $R_S = 100 \text{ k}\Omega$	104
	12			30			
Thermal Breakpt. $f_T$ (typ)	0.25	Hz		0.25	Hz		102
Electrical Breakpt. $f_e$ (typ)	0.19	Hz	$R_L = 2.0 \times 10^{10} \Omega$	0.15	Hz	$R_L = 5.0 \times 10^{10} \Omega$	102
Recommended Operating Temperature	-40 to +70	$^{\circ}\text{C}$	Functional	-40 to +70	$^{\circ}\text{C}$	Functional	
Storage Temperature	-55 to +125	$^{\circ}\text{C}$	$\Delta T < 50^{\circ}\text{C}/\text{min}$	-55 to +125	$^{\circ}\text{C}$	$\Delta T < 50^{\circ}\text{C}/\text{min}$	
Output Impedance	$< R_S$	$\Omega$		$< R_S$	$\Omega$		
Output Protection	Do not exceed a maximum drain current of 50 $\mu\text{A}$			Do not exceed a maximum drain current of 2 mA			

**Characteristics at: Model 479-380/336:** 3.80  $\mu\text{m}$  Channel: 3.71  $\mu\text{m}$  to 3.89  $\mu\text{m}$ , 500 $^{\circ}\text{K}$ , 2 Hz, 1 Hz BW,  $R_T = 25^{\circ}\text{C}$ ,  $R_S = 100 \text{ k}\Omega$   
3.33  $\mu\text{m}$  Channel: 3.2575  $\mu\text{m}$  to 3.4025  $\mu\text{m}$ , 500 $^{\circ}\text{K}$ , 2 Hz, 1 Hz BW,  $R_T = 25^{\circ}\text{C}$ ,  $R_S = 100 \text{ k}\Omega$   
**Model 479M1-380/113:** 3.80  $\mu\text{m}$  Channel: 3.71  $\mu\text{m}$  to 3.89  $\mu\text{m}$ , 500 $^{\circ}\text{K}$ , 2 Hz, 1 Hz BW,  $R_T = 25^{\circ}\text{C}$ ,  $R_S = 100 \text{ k}\Omega$   
4.268  $\mu\text{m}$  Channel: 4.183  $\mu\text{m}$  to 4.353  $\mu\text{m}$ , 500 $^{\circ}\text{K}$ , 2 Hz, 1 Hz BW,  $R_T = 25^{\circ}\text{C}$ ,  $R_S = 100 \text{ k}\Omega$   
**For Both Models:** Data is established on a sample basis and is believed to be representative.

For best results, the following precautions and recommendations should be observed. (See ELTECdata #101):

**Mounting:** Avoid mechanical stresses on case and leads.

**Soldering:** Detectors must be hand soldered to minimize the chance of destroying the internal components. Avoid machine or hot air soldering. Leave a minimum lead length of .250 inch (6.35mm). When soldering to detector leads, use a heat sink between the case and leads. Beware that the new RoHS compliant solders require a higher soldering temperature making heat sinking the detector extremely important.

**Static Discharge:** Protect detectors from electro-static charges.

**Thermal Shock:** Temperature changes and rate of change must be kept to a minimum ( $<50\text{C}^{\circ}/\text{min.}$ ) to prevent damage.

**Noise:** As a resolution or lower information limit, noise is established not only by the detector. Other noise sources are:

- Radiated and conducted RF signals
- Subsequent amplification or signal conditioning stages
- Power supply noise
- Components, such as high value resistors and capacitors (tantalum and aluminum electrolytic)
- Mechanical contacts and weak solder joints
- Shock and vibration excited microphonics
- Outside thermal influences on the detector other than the desired infrared input, i.e. drafts

All of these noise sources should be considered carefully when the information signal is  $<1\text{mV}$ .

**Light Leakage:** Slight sensitivity to visible light leaking through the glass-to-metal seal on the base may be observed.

**Optical Design:** Use of a detector with a filter in an optical system may require consideration of the image displacement toward the filter. This displacement (s) caused by the insertion of a planoparallel plate (filter thickness = t; refractive index = N) is given by  $s = (t/N)(N-1)$ .

**NOTICE:** The information provided herein is believed to be reliable. However, ELTEC Instruments, Inc. assumes no responsibility for inaccuracies or omissions. Due to industry components being incorporated into ELTEC's devices and ELTEC continually striving for product improvement, specifications may change without notice.



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